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# WHAT COALITIONS OF STAKEHOLDERS TO ELECTRIFY MADAGASCAR?

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Dam construction in Sahasinaka site  
Source : GRET

Julien Cerqueira is an energy expert at GRET. He mainly participates in projects concerning electricity access in rural areas and alternative fuel in several countries in Africa and Asia. Founded in 1976, GRET is an international NGO bringing together development professionals. It has been actively fighting poverty and inequalities in the field and on all levels by providing sustainable and innovative responses for the development of solidarity.

## KEYWORDS

- ACCESS TO ENERGY
- COALITION OF STAKEHOLDERS
- RURAL ELECTRIFICATION
- PUBLIC-PRIVATE PARTNERSHIP
- PUBLIC SERVICE

This article analyzes the successes and limits of the Rhyviere hydro power project in Madagascar and raises questions about the role of stakeholders in building an effective and sustainable rural electrification model. By promoting a delegation model based on strong institutions capable of playing their part, this experience demonstrates that civil society organizations have a role to play in building fair and balanced coalitions of stakeholders.

## INTRODUCTION

*With an electricity access rate only reaching 12.3% in 2010, Madagascar is one of Africa's least electrified countries. The situation, common in sub-Saharan Africa, is characterized by a very strong dichotomy of access between urban environments (39% access rate) and rural areas (4.8%). This means that close to 14 million rural people are still living in the dark, without modern energy services (Instat, 2011).*

*While 77% of the country's population lives in extreme poverty, access to a modern energy source seems the prerequisite to increase the means of production and thereby economic development. Improving access to electricity for these rural households is therefore an important stake for economic development and improvement in living conditions.*

*The purpose of this article is to present and examine the results of the Rhyviere rural electrification project<sup>1</sup> carried out by GRET in Madagascar between 2008 and 2015. This project, which benefited to nearly 2,000 households on three electrical grids, encourages upscaling to meet the challenge of electrification of the whole country. It has helped to demonstrate that hydro power constitutes a viable technical solution for electrifying small urban centers, at a tariff both suited to the population's capacity to pay and providing a revenue incentive for the service delegatee.*

*In a context where practical implementation of a relatively stabilized sectoral framework in Madagascar is somewhat random, GRET focuses on structuring and strengthening a balanced coalition of stakeholders. By standardizing the sharing of responsibilities between national institutions, private businesses, local authorities and civil society organizations, the project has helped to stabilize the public-private partnership to achieve sustainable service for rural populations.*

<sup>1</sup> Village hydro power grids, energy and respect for the environment

# 1. CONTEXT: AN ELECTRICITY REFORM INCAPABLE OF LIMITING ELECTRICITY ACCESS INEQUALITY IN MADAGASCAR

## 1.1. PROGRESS AND LIMITATIONS OF THE ELECTRICITY SECTOR REFORM IN MADAGASCAR

Aware of the country's weak electrification strategy and of the need to increase energy access for rural populations, in 1998 the Malagasy State started to reform the sector, through several key measures:

- Liberalizing the electricity sector to give new operators the opportunity to step in. Breaking the monopoly of Jirama, the State company, allowing the electrical energy production, transportation and distribution activities to be provided by private companies, selected through call for tender<sup>2</sup>.
- The Agency for the Regulation of Electricity (ORE) was created as an autonomous regulation body. It acts as the usual regulator of the sector, setting tariffs, ensuring compliance with standards and legal and regulatory provisions, promoting competition and the participation of the private sector, while protecting the interests of consumers.
- Establishing financial incentives to fund rural electrification through the creation of the National Electricity Fund (FNE). The FNE may subsidize up to 70% of the cost of the rural electrical infrastructure installed by delegates<sup>3</sup>, making it possible to lower prices to within the consumers' capacity to pay.
- Taking into account the needs of rural populations through the creation of the Agency for the Development of Rural Electrification (Ader). Ader operates under the Ministry of Energy, with a view to increasing the rate of access to electricity of rural populations; it promotes and develops new projects, while monitoring autonomous centers with installed power under 250 kW<sup>4</sup>.

Nearly 15 years after the sector's reforms were adopted, the outcome in terms of access to energy remains nevertheless incomplete. The reform's main success is that it has significantly helped increase the private sector's participation. Although Jirama remains the country's main electricity supplier, private operators now generate nearly a quarter of the country's overall production, almost 300 GWh in 2011 (WWF, 2012). Rural communities are the main beneficiaries of the reform since all rural sites are supplied by private operators. However, the sustainability of the infrastructure put in place by these operators is quite random: of the 94 rural networks run by operators<sup>5</sup>, 41 grids were not functional at end 2014. Private companies have the worst results, since one rural network managed by a delegatee out of two is non-functional.

In addition, the reform did not help attract investors to the rural electrification sector. Between 2000 and May 2014, only USD 18.2M<sup>6</sup>

<sup>2</sup> Authorizing municipalities or associations of users to ensure the provision of the service. This possibility was granted through a dispensation procedure requiring no competitive process.

<sup>3</sup> In this article we use the term "delegatee" to designate the company to which the State outsources the construction, management and maintenance of the service. Malagasy law speaks of "licensee" or "concessionaire", depending on the installed power threshold of the contract.

<sup>4</sup> In actual fact, this power limit is not applied. Any autonomous center not supplied by Jirama when the Act was passed is placed under the responsibility of Ader.

<sup>5</sup> This is inferred from figures provided by ORE on 31/12/2014. At that time there were seven grids operated by associations or cooperatives, eight by the municipalities and 79 by private companies.

<sup>6</sup> Source: Ader, from interviews carried out by GRET in 2015.



Figure 1. Project location - Source: FERDI

were invested to develop new projects in total by the State, private delegates or donors, i.e. barely over USD 1M per year. This degree of funding is therefore particularly low although the financial incentives are significant, especially for renewable energies.

## 1.2. THE RHYVIERE PROJECT DESIGNED TO MEET THE SECTOR'S WEAKNESSES

In this context, since 2008 GRET, an international development NGO, has been implementing the Rhyviere project which aims to design, test, and popularize mechanisms for the development of self-sufficient small hydro power networks adapted to the rural context of Madagascar. This project is intended to demonstrate the development potential of hydro power grids in rural areas by creating the conditions to entice private operators. Funded by the European Union (Energy Facility), Ader and private operators, this project has enabled the creation of three electrical grids serving approximately 10,000 people across 5 municipalities in the country.

Designed to mitigate the weaknesses identified in the rural electrification sector, the project met

with a triple challenge: (i) to develop technical models in line with the local context to reduce the cost of rural electrification, (ii) to develop a methodology to analyze and select the delegates that renders a utility concession attractive for private companies, and (iii) to accompany the sector's stakeholders, and in particular the grid construction and operation companies, through technical support and capacity-building.

The project implementation was considerably delayed primarily because of the political crisis of 2009 which led to the exile of President Marc Ravalomanana and the establishment of a transition regime. The national institutions and local authorities progressively collapsed until the end of 2013, which delayed implementation of several project activities, in particular those regarding the selection and acknowledgment by the State of the delegates who would be providing the electrical service. In addition the work has been delayed due to various problems - administrative issues (delay in issuing the environmental permit, sale of an equipment container by the port, etc.), the weather (cyclone washing away part of a dam under construction) and financial issues (delays in payment of Ader's subsidy, bank credit turned down, etc.). Despite these problems, the three hydro power grids were completed by the end of the project:

- The Tolongoina site serving one municipality started operating in June 2013;
- The Sahasinaka site serving three municipalities started operating in December 2015;
- The Ampasimbe site serving one municipality started operating in January 2016.

## 2. INNOVATION TO STRUCTURE THE HYDRO POWER SECTOR

### 2.1. A METHODOLOGY OF ACTION THAT STRUCTURES ALL STAKEHOLDERS

The project's first innovation consisted in designing an operating methodology making it possible to structure projects through the development of standardized procedures and tools that the stakeholders could use when carrying out their duties. Implementation of a hydro power project was divided into five phases:

- **Phase 1 - Study:** identification of potential sites, reconnaissance survey and preliminary design (PD). Once the PD findings have been approved by the local authorities, the project is officially included in the Rhyviere program;
- **Phase 2 - Fund:** selection of the delegatee through call for tender and signing of a financing agreement to formalize allocation of the investment between the delegatee, Ader, the municipality / intermunicipal group and GRET;
- **Phase 3 - Design:** detailed design (DD) study to validate the final technical sizing of the project. This DD includes, if necessary, an environmental impact assessment;
- **Phase 4 - Build:** construction, by the delegatee or subcontractors, of the electrical and civil engineering infrastructures, disbursement of subsidies by tranche and network compliance certified by ORE;
- **Phase 5 - Operate:** training of and support to the delegatee's activities of technical monitoring and commercial management of the service, the municipality / intermunicipal grouping and users through their association.

Structuring these activities has the advantage of defining the role of each stakeholder in the operation, and thus helping each stakeholder learn its responsibilities in the electricity service. The segmentation of a "typical project" clearly states the responsibilities of each stakeholder and structures an implementation methodology that had hitherto never been really formalized.

In addition, this approach has formalized the role of the municipalities, which was previously limited to obtaining the property rights and easements for the delegatee. In the framework of the Rhyviere project, the municipalities now take part firstly in the project activities implementation phase (identification of potential hydro power sites, presentation and approval of the service sizing, participation in delegatee selection, involvement in monitoring the works, etc.), and later as local project manager for the service, in charge of monitoring and controlling the service operation. A concession contract between the municipality and the delegatee, appended to the concession award decree, formalizes the municipality's role.

This integration of the municipalities is reflected financially by a tax on each kWh consumed added to the electricity rate to fund public lighting and the cost of electricity of municipal public services. This tax, returned to the municipality, can also be used to help fund grid extensions to new neighborhoods or new connection subsidies.

***"THE SEGMENTATION OF A "TYPICAL PROJECT" CLEARLY STATES THE RESPONSIBILITIES OF EACH STAKEHOLDER AND STRUCTURES AN IMPLEMENTATION METHODOLOGY THAT HAD HITHERTO NEVER BEEN REALLY FORMALIZED."***

## Role of stakeholders in service implementation and monitoring

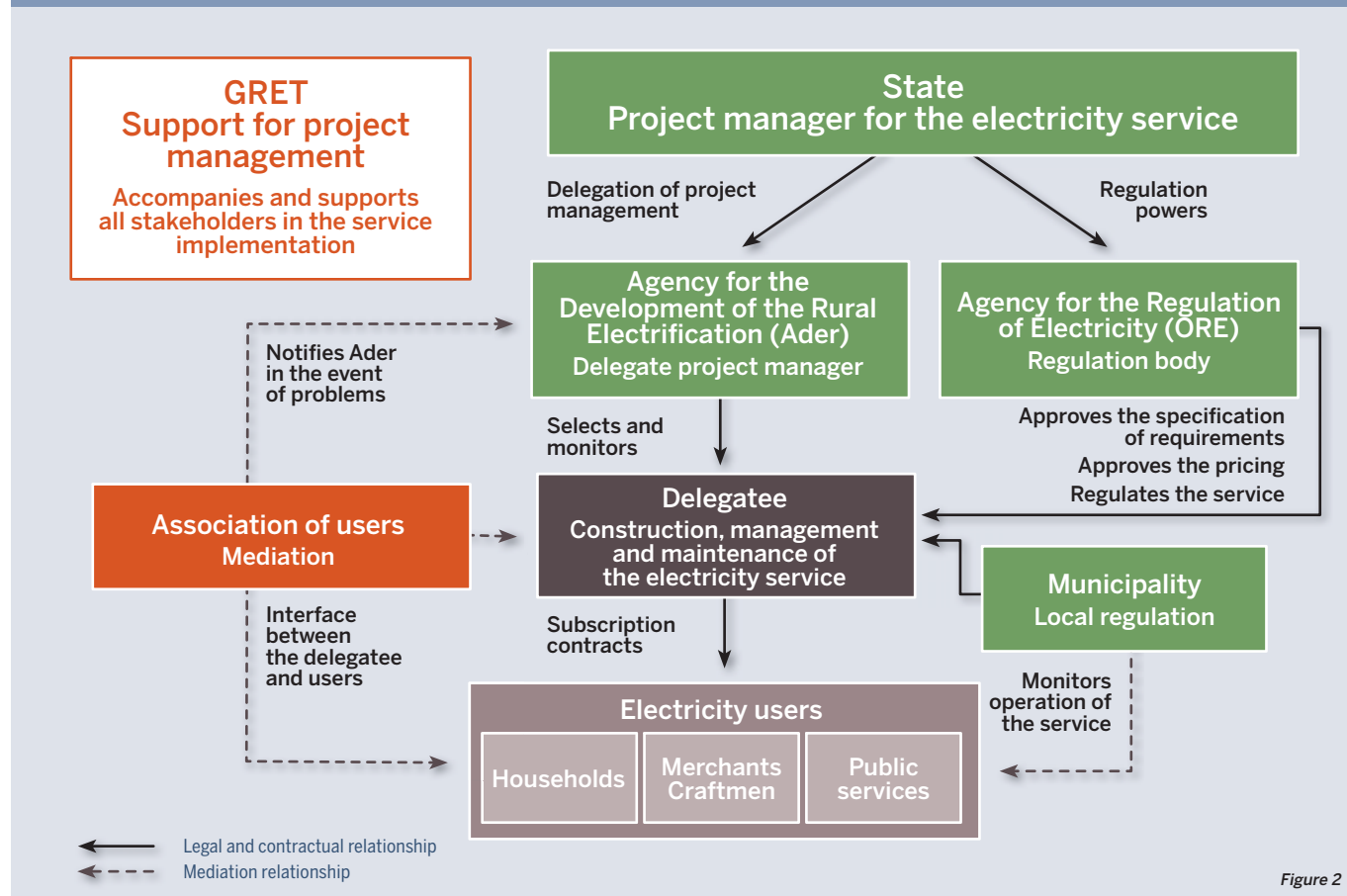


Figure 2

## 2.2. CO-DESIGNING TECHNICAL STANDARDS TO REDUCE COSTS

Another contribution of this methodological improvement work is the optimization of technical standards for electrical grids in rural areas. The standards used in Madagascar, formerly based on old decrees (1960 to 1964), often taken from urbanized countries, were unsuitable for rural electrification. It would entail an overinvestment in electrical infrastructure and a reduced profitability of rural networks. Defining standards adapted to rural electrification and, more particularly, to micro hydro power, was one of the program's areas requiring work to improve the sector's development. This was all the more relevant because in Madagascar there is no real technological constraint for hydro power in particular, and for rural electrification in general: skills in electricity, hydrology and electro-mechanics are available and a few international turbine manufacturers have local agents. The challenge was therefore to reduce costs to facilitate the implementation of electrification projects.

The GRET team carried out a technical standards optimization process together with Ader and ORE in order to define requirement levels suited to the local context, without sacrificing the required safety of these infrastructures. After working several months with the competent authorities, two guides were designed:

- *Specifications for the design of hydro power networks in rural areas:* it provides lighter design standards for the construction of micro hydro power stations and electrical rural grids and recommends the methodology to carry out studies and choose financing: orchestrating investments to avoid overinvestment at the project launch, contents of the preliminary design studies, recommendations for the sizing of the infrastructure according to the context, templates for works drawings, etc.;
- *Specifications for the operation and maintenance of hydro power networks in rural areas:* it specifies the standards to adopt in order to ensure a high service quality in compliance with the regulations in force and to maximize the service life of each network component. It details the activities required to operate, maintain, and service a rural electrical network, by equipment type (dam, civil engineering works, turbine, grid, etc.) and provides recommendations on the necessary skills and personnel.



**12.3%**

of the population  
is electrified in  
Madagascar

**14 MILLION  
PEOPLE**

are living in the dark  
in rural areas

**77% OF THE  
POPULATION**

lives in extreme poverty



Water sharing and deforestation in the watershed - Source: GRET

These two documents are designed as proper guides to support the implementation of investment, by either the delegatee or projects sponsors (donors, NGOs, etc.). They have not yet legally replaced previous regulations, but they have been used since their inception as a required part of Ader's calls for tender for rural networks.

### 2.3. THE ENVIRONMENT-ENERGY CONNECTION: AN ORIGINAL APPROACH FOR RESOURCE SUSTAINABILITY

The project tested on one of the sites integrating an environmental protection component with a view to achieving sustainability of the water resource, resulting in a mechanism of Payment of Environmental Services (PES)<sup>7</sup>. The watershed whose point of concentration is a waterfall used by the Tolongoina project mainly consists of a protected forest area. The agricultural activities in this basin pose two major risks for the preservation of the water resource: (i) a decline in water quality through increased erosion, which may silt up the facilities and damage the turbine blades by abrasion from sand; (ii) an irregular river flow, with a decrease during low water periods and an increased risk of flooding during rains.

The Tolongoina site, with a small watershed (6 km<sup>2</sup>) limiting the number of stakeholders involved, was the perfect place to conduct an experiment on a PES mechanism. In the past, conflicts had arisen because the municipality banned slash-and-burn practices, so it seemed relevant to begin negotiations to recognize and reward the services rendered by watershed users in maintaining and developing agricultural practices compatible with the provision of water services. The PES mechanism was all the more relevant because the farmers in the watershed were not going to benefit from the village electrification project.

The originality of IRD's approach was based on the co-construction of knowledge concerning the hydrological services, in order to formalize with the populations of the watershed a shared understanding of both the hydrological services and the perceptions of compatible activities and those that pose a risk to these services. Interviews with farmers and electricity users led to a consensus on the fact that certain agricultural activities threatened the quantity and quality of the water resource.

On the basis of this consensus, new discussions were carried out to convince the electricity users of the need to set up a compensation mechanism for the service suppliers to adapt their practices in order to ensure the sustainability of the water resource. The PES mechanism is therefore built around a contribution from the service beneficiaries (users through their association, municipality, delegatee) paid to the suppliers of the environmental service to compensate them. This contribution is considered "voluntary" because all service beneficiaries have voluntarily decided on the principle of contribution and its amount. The payback for this compensation is the adoption or strengthening of practices conducive to the preservation of the water resource.

<sup>7</sup> This work was carried out together with a team from the Institut de Recherche pour le Développement (IRD) working on environmental services, within the framework of the SERENA program dealing with issues related to the emergence and implementation of the notion of "environmental service" in the field of public policies for rural areas. SERENA is a research project carried by IRD, CIRAD and IRSTEA between 2009 and 2013. It brought together some 30 researchers.

## Organization of the PES mechanism in Tolongoina (Toillier, 2011)

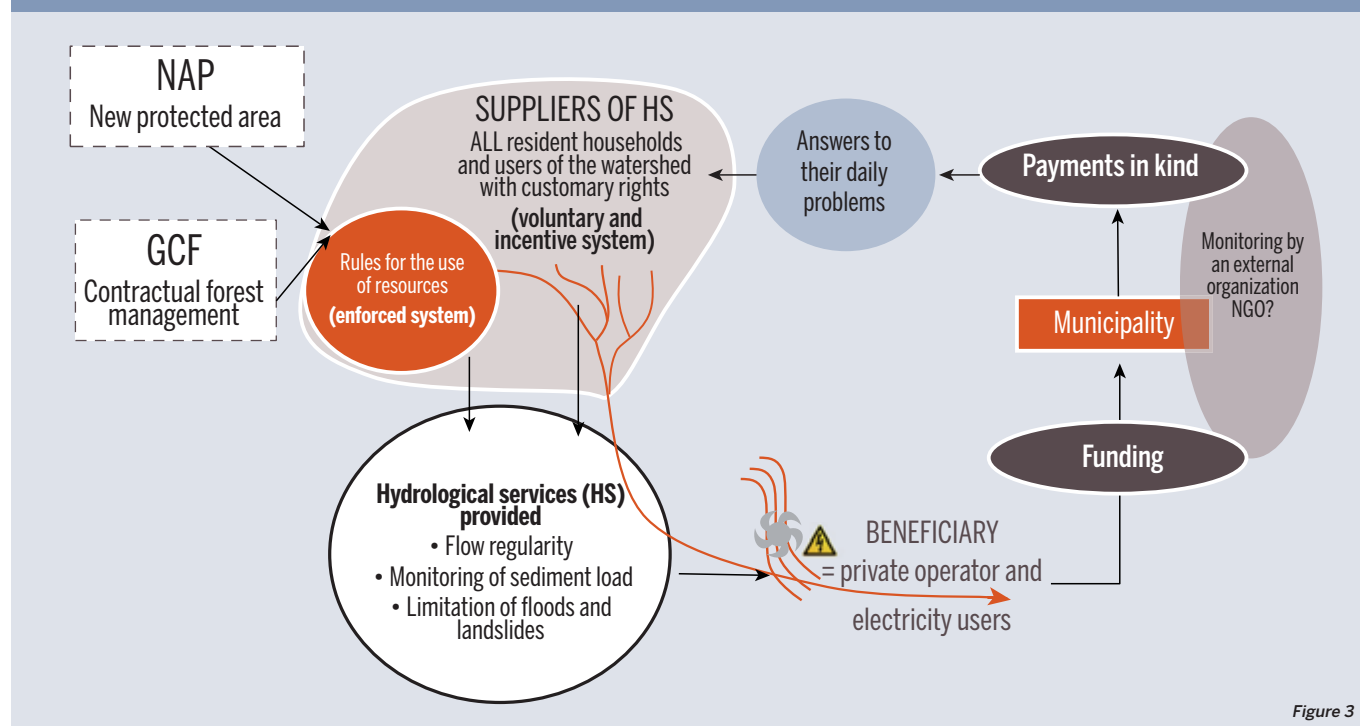


Figure 3

The PES contract, which sets forth the organization of compensation between suppliers and recipients of the Environmental Service (ES), was signed in September 2013. This agreement formalizes the creation of the Andasy watershed management committee (KOMSAHA), whose board brings together representatives of the parties to the agreement, and organizes the payment of the contributions of each ES beneficiary: a 2.5% tax on the monthly electrical consumption of subscribers; flat

rates of MGA 100,000 per month (EUR 29) for the delegatee and MGA 90,000 per month (EUR 26) for the municipality. The annual amount is expected to be MGA 3.4M (EUR 971), which should serve to support the implementation of the conservation agricultural activities and the conservation of the forest in the basin.

## 3. RESULTS AND LESSONS LEARNT FROM THE RHYVIERE PROJECT

Table 1. Main features of the three grids set up by the Rhyviere project

Site	Tolongoina	Sahasinaka	Ampasimbe*
Region	Vatovavy Fitovinany	Vatovavy Fitovinany	Atsinanana
Nbr of municipalities	1	3	1
Target population	355 households	900 households	700 households (1,500 households)
Installed power capacity	2 x 60 kW	3 x 80 kW	3 x 80 kW (2 x 330 kW)
Investment budget	€ 192,000	€ 408,000	€ 409,000 (€ 1.025M)
% financed by the delegatee	15.7%**	31.5 %	33.5% (73.5%)
Tariff	€ 1.3/month	€ 1.3/month	€ 1.3/month
• Subscription	+ € 0.10/kWh	+ € 0.15/kWh	+ € 0.11/kWh
• Lightbulb flat rate	€ 0.50/lightbulb/month	€ 0.80/lightbulb/month	€ 0.33/lightbulb/month

\* During the detailed design study, the delegatee of the Ampasimbe site decided to increase site capacity by eventually installing two 330 kW turbines in order to sell the surplus power to the Jirama electrical grid of the seaside town of Foulpointe some 20 km away. The figures in brackets concern this new sizing.

\*\* The financial sustainability outlook for the Tolongoina site being fairly weak, it was decided with Ader and ORE to increase the subsidy amount relative to the 70% ceiling usually allowed. The delegate's investment is therefore less than that for other sites.

## Tolongoina grid electricity consumption (June 2014 - May 2015)

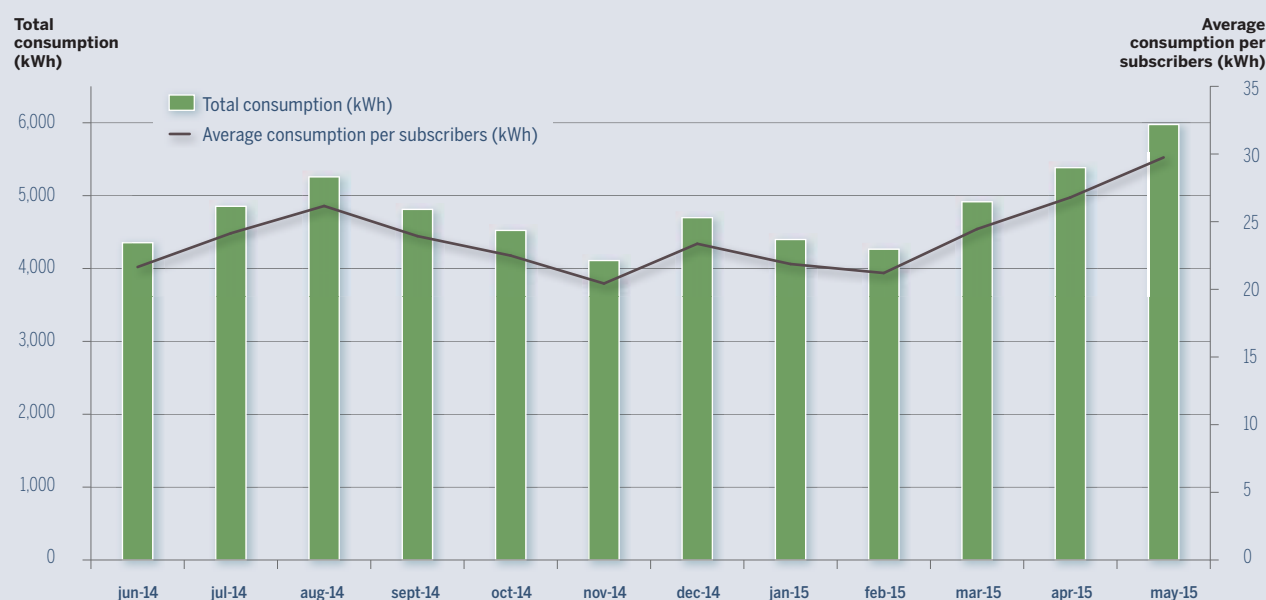


Figure 4

### 3.1. A QUALITY OF SERVICE DESPITE PERSISTENT INEQUALITY OF ACCESS

Many constraints, in particular concerning the political situation in Madagascar, have caused the Rhyviere project to experience a significant delay which has shifted the start of service of the hydroelectric networks. An analysis of the operating data of the Tolongoina site, operational since June 2013, nevertheless shows that the proposed electrification solutions are suitable to the rural context. The data from the first two years of operation, as well as the satisfaction survey carried out by the project, confirm the good results:

- The number of subscribers has achieved after two years of service the planned forecast for the sixth year of operation, while new connection applications are pending because of meter stockouts;
- The average consumption per subscriber is consistent with forecasts. It shows a non-linear but constant rise since the start of service;
- Over one-third of households have acquired electrical equipment (radio, television, DVD player);
- 87% of the local firms were connected to the network in the first six months of operation, and seven new companies were created during this period as a direct result of the arrival of electricity (grocery store, bar, electronic repair workshop, multimedia store). In addition, 29%

of businesses said they had acquired new equipment after the electrical grid started operating (refrigerators and freezers, soldering iron, mixer robot, multimedia equipment, etc.). However, no specific study has been carried out to quantify specifically the impact of electricity on these companies' turnover;

- Peak consumption rose from 49 kW in 2013 to 55 kW in 2014. The installed power of 60 kW has now been reached, which makes the purchase of a second turbine a priority;

**Table 2. Key figures of the Tolongoina hydro power network (June 2013 - May 2015)**

Number of subscribing households	200
Average consumption per subscriber	24 kWh/month
Peak consumption	55 kW
Connection rate	56% of households
Connection subsidy	MGA 50,000 (€ 14)

**“THE LACK OF CONTROL AND REGULATION OF THE DELEGATEES AND THEIR LOW FINANCIAL INVESTMENT IN THE INFRASTRUCTURE CONSTRUCTION SEEM TO BE THE MAIN REASONS FOR THE CONTINUAL WEAKENING OF CONCESSION CONTRACTS SANCTIONED IN THE PAST.”**



- Subscribers are mostly satisfied with the quality of service and the electricity tariff. The collection rate exceeds 95%;
- The delegatee controls his grid and performs his duties. He carries out improvements on the infrastructure to limit the risk of outages and of service interruption. Service availability is greater than 95%, in accordance with the requirements of the public service concession contract.

However, a closer analysis of consumption data shows that it is the more affluent households (and thus those having a higher individual consumption) that are connected. Thus, according to the satisfaction survey GRET carried out after 6 months of service, 98% of affluent households and 52% of medium income households were connected to the network, but only 3% of poor households<sup>8</sup>. Although a connection plan had been specially designed for poor households, the “lightbulb flat rate”, allowing connection without a meter to operate only one or two lightbulbs<sup>9</sup>. Despite very attractive pricing, and even though connection was subsidized, only 6% of households are connected to this „lightbulb flat rate“. Therefore the good results of the Tolongoina grid probably mask a strong inequality in access to the service.

This phenomenon can be explained by (i) the nature of the subsidy mechanism, of the type *Output Based Aid*, which encourages the

delegatee to make network connections quickly. Poor households, waiting for the service to be tried and tested before connecting to the grid so as not to “lose” their investment, benefit less from subsidies; and (ii) a higher connection cost for poor households due to the grid configuration, which covers the main roads when such households tend to be on secondary roads; (iii) a policy of the delegatee to willingly promote full connection at the expense of the “lightbulb flat rate”, less attractive financially.

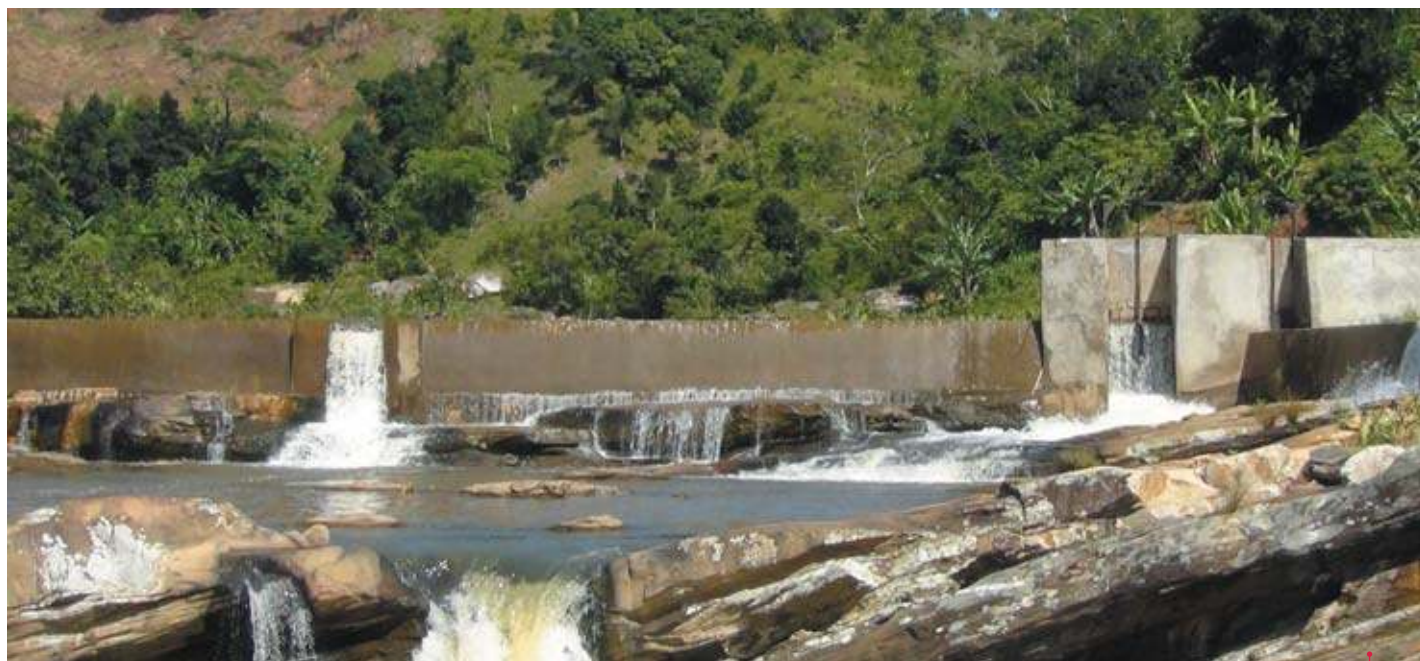
Although it is complex to target the poorest so that they can benefit most from connection subsidies or to encourage them to connect to the grid from the first months of service, new strategies can be set up to reduce inequality of access to electricity. This can go be done by (i) better sizing of the electrical grid during the design phase to setup low-voltage lines passing through the heart of low income neighborhoods, thus reducing the cost of connection, (ii) mobilizing municipalities to allocate connection subsidies, (iii) raising awareness among the poorest households at the start of service, or (iv) dividing the subsidies between the meter subscription and the flat rate subscription, to ensure all subsidies do not solely go to more affluent households.

<sup>8</sup> Household categorization is based on a combination of criteria: main activity of the head of the household, education level, occupancy status, dwelling type (general condition, walls and roof).

<sup>9</sup> This package allows poor households to benefit from lighting at a very reduced price, less than the average expenditure for lighting with an oil lamp.

Tolongoina grid - Source: GRET





Sahasinaka hydroelectric dam - Source: GRET

### 3.2. THE PERFECT DELEGATEE: AN INVESTOR WITH FUNDING AND TECHNICAL SKILLS

The delegatee is the cornerstone of the service. The relative weakness of national institutions, combined with their limited means of control and regulation, puts sole responsibility for service quality squarely on the delegatee's shoulders; it is therefore important to select a competent delegatee. The delegates selected for the Rhyviere project sites had very varied profiles:

- Tolongoina site: small electricity business made up by several shareholders including university professors specialized in energy. The delegatee had good technical skills but little experience in construction projects.
- Sahasinaka site: a small construction company. The delegatee turned to outside service providers for the electrical skills and construction of the dam.
- Ampasimbe site: civil engineering and drilling company, whose CEO comes from the project area. His profile is more like that of an investor who expects a return on investment in the long term. He has acquired in his company the required technical skills in electricity and demonstrated a true capability to carry out the infrastructure works.

For each site, the tenders were assessed on the basis of precise criteria. The technical proposal was analyzed first, and only tenders attaining a minimum of 60 points were shortlisted. Next the

financial evaluation graded proposals on the basis of the amount of the subsidy requested to carry out the work and the proposed electricity rates.

**Table 3. Technical criteria for analysis of tenders**

Analyzed criterion	Number of points
Activities and experiences in construction and management of an electrical network	20
Proposed solutions for the construction of infrastructure	30
Proposed solutions for management and provision of the service	30
Understanding of public service concession	10
Motivation for the project	10

The lessons learned during the project serve to emphasize the key aspects of the delegatee profile:

- Broader skills: the delegatee's function is multifarious, calling on a variety of skills, both technical and in administration, logistics, supervision, management and negotiation. Delegates with good technical skills in the field of electricity can be very quickly overwhelmed by the constraints of building hydroelectric infrastructure and managing the service. Technical skills, while necessary, are insufficient on their own;
- Suitable financial capabilities: the delegatee, who must cover at least 30% of the investment, must be able to obtain this funding. The project has experienced several delays because it did not check the financial standing of the delegates, on the one hand



because it is difficult to assess the financial standing of a business when the data supplied by the bidders is not standard and hard to check, and on the other hand, because a bidder may indicate he will use of a line of credit but subsequently not be granted credit once the concession contract has been signed;

- Investor more than entrepreneur: the delegatee must develop, as soon as he is selected, a medium- or even long-term vision of his activity<sup>10</sup>. This implies in the first place understanding that a utility concession contract is not a works contract: since the return on investment is only possible if service continuity is maintained, the delegatee must promote equipment quality rather than cost reductions that could subsequently lower the profitability of its investment.

The ideal profile to become a delegatee is that of an investor with a service vision and sufficient financial resources, or the ability to mobilize such resources, supported by a team with quality technical expertise.

### 3.3. A MECHANISM FOR PAYMENT OF ENVIRONMENTAL SERVICES WITH MODEST BUT PROMISING IMPACT

After almost two years of operation, the PES contract has shown that though limited, its effects are real. The money collected has been used to roll out several activities planned in the watershed management scheme, such as monitoring trips to check the state of preservation of the forest or the development of food crops compatible with the protection of the catchment area (beans, peanuts, demonstration plot on good practices for growing ginger, etc.). Even if the impact of these activities on the quality of the environmental service is as yet limited, they serve to improve farmers' living conditions. The farmers regularly submit projects to the committee, which approves funding and supports implementation of the projects.

In the end, it appears that the biggest success of the PES mechanism is to have encouraged a dialog between the inhabitants of the watershed and populations living downstream, on the subject of water resource preservation. While the service providers do not benefit from the effects of electrification, they have agreed "as a service" because their problems are being considered by the beneficiaries (Toillier, 2011). The watershed management committee becomes a sustainable structure rewarding agricultural practices compatible with proper operation of the hydro power station, while at the same time the farmers acquire these good practices. The method based on co-constructing a shared vision around hazards and good practices seems to have created favorable conditions for acceptance of the PES mechanism.

The main weakness of the mechanism, in addition to the fact that the money collected is insufficient to cover all activities identified as necessary to preserve the water resource, lies in the difficulty of monitoring this mechanism, which is not part of an independent project management. The Tolongoina municipality cannot perform this function as it is itself the beneficiary of the ES and stakeholder of the PES contract. The system is missing a third stakeholder

who would guarantee the preservation of the water service. GRET will continue to perform this function as long as it is present in the area, but its role is not to continue supporting the local operators in implementing this contract. The PES contract renewal in 2016 should provide the opportunity to fill this gap.

## 4. THE REASON FOR THE SUCCESS OF THE RHYVIERE PROJECT: THE CREATION OF A STAKEHOLDER COALITION BETWEEN PUBLIC AUTHORITIES, BUSINESSES AND CIVIL SOCIETY

### 4.1. THE NEED FOR A STRONG PUBLIC AUTHORITY TO SUPPORT PUBLIC-PRIVATE PARTNERSHIP

The analysis of concession practices and relations between the State, the construction owner through Ader and the delegatee, shows that public authorities do not really carry out their duties under the law, which undermines the public-private partnership. Whereas the legal framework in Madagascar is fairly well designed and the institutional framework has been stable for nearly 15 years, delegatees are barely controlled and poorly regulated, which seems to be the main source for the continual weakening of sanctioned concession contracts. Experience acquired on the Rhyviere project shows, on the contrary, all the importance of having a strong public authority to encourage the sustainability of public-private partnerships.

This is illustrated on the question of control of the investment made by the delegatees. Since it is mainly the delegatees who carry out the service sizing preliminary studies (PD and DD), they themselves define the total amount of the investment on which their subsidy will be indexed. However, Ader does not have the means to analyze these technical files in depth, which leaves the

**"EXPERIENCE ACQUIRED ON THE RHYVIERE PROJECT SHOWS, ON THE CONTRARY, ALL THE IMPORTANCE OF HAVING A STRONG PUBLIC AUTHORITY TO ENCOURAGE THE SUSTAINABILITY OF PUBLIC-PRIVATE PARTNERSHIPS."**

<sup>10</sup> In Madagascar, rural electrification concession contracts are usually granted for a period of 20 to 30 years. ORE defines the duration of the concession contract as a function of the forecast business plan of the service, in order to guarantee a sufficient return on investment to the delegatee.

door open for the delegatee to overestimate the investment, therefore raising the amount of the subsidy it receives. This is even more plausible since Ader does not check the investment made by the delegatee during the works, since it has no permanent presence on the worksites and does not mandate an independent works controller. Delegates may therefore play with the specifications of materials and declare costs of works exceeding actual costs.

The assumption that we make as a result of these observations is that several delegates have invested nothing or very little in building their infrastructure. By overestimating the investment budget in the preliminary studies and by reducing the quality of the work, it would be possible for a delegatee to carry out the work without investing its own contribution, and even make a profit. If he does not invest, the delegatee's position changes from that of concessionaire to lessor (Levy and Ged, 2007), which changes his assessment of the risk. This may explain the high proportion of grids abandoned by private delegates: a company not constrained by return on investment can drop the service in the event of difficulties.

The methodology GRET deployed has ensured that delegates invest. It established three levels of control: (i) the level of subsidy to be received by the delegatee is calculated on the basis of the pre-project study, the preliminary design, carried out by the project team; (ii) GRET checked on funds disbursed by the delegatee, through their invoices of equipment and supplies; (iii) the works carried out are inspected by the project team, as well as by an engineering firm mandated by the municipality. GRET has helped Ader gain awareness of its responsibilities and has demonstrated the need to structure a strong public authority to implement a public-private partnership.

#### **4.2. INTEGRATING LOCAL AUTHORITIES, A NECESSARY LINK TO BALANCE THE CONCESSION CONTRACT AND ENSURE LOCAL POPULATIONS RECEIVE BETTER SERVICE**

Madagascar's institutional framework gives local authorities a limited role. Since project ownership for rural electrification is national, local authorities are poorly informed of the issues in this sector and only slightly involved in projects. These municipalities nevertheless have a role to play in the project management of the rural electrification scheme, and can complement the national authorities:

- Local authorities can play a part in identifying projects and prioritizing needs. The approach used for the Rhyviere project thus relied on (i) involving the municipalities to identify

potential energy resources in their territory and (ii) testing a municipal electrification planning scheme to determine the need and demand for electricity, propose solutions adapted to each site, and prioritize the most relevant projects. The municipalities can reclaim control over the issues of rural electrification, which are debated as a component of local development;

- The municipalities must be integrated in the monitoring and the local regulation of the service. In a context where Ader and ORE are distant from the electrified sites and do not have sufficient means to monitor the situation properly, turning to local authorities is a good way of balancing the public-private partnership. A contract between the delegatee and the municipality makes it possible to designate the municipality as project owner, acting on behalf of the Ministry for Energy, in order to control the quality of the public service and monitor the delegatee. The municipality thus becomes local regulator guaranteeing compliance with the social purpose of the service.

#### **4.3. ROLE OF NGOS: COMPLIANCE WITH THE RULES, SUPPORT TO STAKEHOLDERS AND SECURING THE CONCESSION CONTRACT**

Alongside stakeholders acknowledged by the legal framework and those whose legitimacy lies in their local presence, what is the role of the NGOs who often sponsor rural electrification projects? In the example of the Rhyviere project, GRET facilitated structuring the coalition of stakeholders, which gave it strength and relevance.

Firstly, GRET defended before the other stakeholders the strict observance of the legal framework, so often neglected. Whereas traditional concession practices were completely divorced from the very letter of the law, GRET based its actions on compliance with these rules and pushed for their application. The control mechanisms deployed around the main steps of the project have therefore encouraged, or even forced, the other stakeholders to play their part in the public-private partnership.

Secondly, the presence of GRET contributed to the emergence of a better understanding of the interactions between the stakeholders. Ader, ORE, delegates, engineering firms, municipalities and users' associations were strengthened both to ensure they understood their role in the country's rural electrification strategy, and to enable them acquiring a better knowledge of the other players in the sector. An effective coalition of stakeholders can only emerge when businesses, local authorities and national administrations perceive themselves as partners committed toward achieving the same goal.

Finally, the work to formalize the standards, procedures and tools carried out by the project team constitutes a basis that makes the public-private partnership safer, for the national authorities and the delegates as well. The project feedback shows that delegates are reassured by good quality data and well-established procedures. Far from slowing down electrification project implementation, the steps of diagnosis, sizing, and control ensure a better chance of sustainability of the service, which is encouraging for both the authorities and delegates.

## CONCLUSION

The lessons learned from the Rhyviere project provide options to improve the mechanism for concessions in Madagascar. Whereas the legal framework is stable and the competency of both public and private stakeholders is rising, improvements are needed to enhance the impact of rural electrification projects:

- Public authorities must impose their definition of the infrastructure, particularly so when they subsidize a part of the works. Using independent engineering firms to carry out the preliminary design studies and to control the delegates will ensure the delegatee's level of financial investment is adequate;
- The delegatee's financial commitment must be real and relatively high: it is a pledge of motivation and moral commitment to the service. As a corollary, it is necessary to develop financing solutions allowing private companies to engage in rural electrification projects;
- The local authorities must take part in the project ownership to complement the national authorities. They can act as local regulators, capable of balancing the concession contract to guarantee the social goal of the service.

Finally, the project has highlighted the fact that coalitions of stakeholders comprising the State, local communities, businesses and civil society organizations are capable of providing innovative solutions to meet the challenge of rural electrification. By avoiding the pitfalls of dogmatism and simplification, these open and balanced coalitions can offer appropriate solutions to promote universal access to energy that is affordable, reliable, sustainable and modern.

A question nevertheless remains: the impact of the project on economic development and on the living conditions of households. The analysis of the Tolongoina site, in service for more than two years, suggests a true impact: many households have acquired electrical equipment, craftsmen have adapted their production tools, health centers have electricity 24/7. However, it would be necessary to carry out a more precise analysis of these phenomena to better quantify and understand the project's actual socio-economic impact.

A new phase of the project, started in 2015, covers the electrification of three new sites to serve approximately 50,000 beneficiaries in the regions of Sofia, Haute Matsiatra and Amoron'i Mania. It incorporates a specific component to encourage economic development by supporting the small and medium enterprises of the towns concerned. This specific work should strengthen the effects of electrification on the populations and improve living conditions in the target areas.

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